II. "Researches on the Poison-apparatus in the *Actiniadæ*." By PHILIP HENRY GOSSE, Esq., F.R.S. Received January 18, 1858.

(Abstract.)

The organs which have been termed "thread-cells," "thread-capsules," "urticating organs," "lasso-cells," &c., I propose to call *cnidæ*. They are found in various tissues of the body, but are specially localized in two sets of organs, which I call *craspeda* and *acontia*. The *craspeda* are gelatinous cords connected throughout their length with the free edges of the muscular septa. The *acontia* are somewhat similar cords, but free throughout, except at their base, where they are inserted into the septa. The cord-like appearance of these latter organs is, however, illusory, as each is a narrow ribbon with involute margins. Both the *craspeda* and the *acontia* are composed of a clear plasma, in which many *cnidæ* are crowded.

The *craspeda* appear to be universally possessed by this tribe of animals, but the *acontia* are limited to a few genera, principally *Sagartia* and *Adamsia*. They are ejected from the body of the animal, and are again withdrawn.

For the emission of these organs special orifices exist, which I term *cinclides*. These are minute perforations of the muscular coats and the integument, bearing a resemblance in appearance to the spiracles of insects. Being placed in the interseptal spaces, they have a perpendicular arrangement, but are not regularly disposed in any other respect. They can be opened widely, or perfectly closed at the will of the animal; and are well seen, under a low power of the microscope, when a *Sagartia bellis* or *dianthus* is much distended in a parallel-sided glass vessel, with a strong light behind it. The width of these orifices varies from $\frac{1}{300}$th to $\frac{1}{50}$th of an inch. No ciliary current passes through them.

Under irritation the *Sagartia* forcibly and repeatedly contracts its body, forcing out the water which had distended its aquiferous canals and the general cavity of the body. Much of the fluid finds vent at these foramina, carrying with it the free floating part of some or other of the numerous *acontia*, each through that *cinclis* which happens to lie nearest to it. The frequency with which the *acontia*

escape in a *loop* or *bight*, shows that the issue is the result of a merely mechanical action, viz. that of the escaping water.

The *cnidæ* occur under four distinct forms. 1. Chambered cnidæ (*Cnidæ cameratæ*). This is the most widely distributed, and the most elaborately armed. In *Cyathina Smithii* they occur of comparatively large size, and are therefore well suited for observation. They are transparent, colourless vesicles, of a long, oval figure, $\frac{1}{260}$th of an inch in length, and $\frac{1}{2000}$th in diameter. A fusiform chamber passes through the centre of the anterior moiety, merging at one extremity into the walls of the *cnida*, and at the other diminishing to a slender chord, which is irregularly coiled within the general cavity.

Under stimulus the *cnidæ* suddenly expel their contents with great force. In general the eye can scarcely follow the excessive rapidity with which the chamber and its twining thread are shot forth. When fully expelled, the thread, which I distinguish by the term *ecthoræum*, is often thirty times as long as the *cnida*; but in *Sagartia* generally, it frequently is not more than once and a half the length of the *cnida*.

In the *ecthoræum* from *chambered cnidæ* the basal portion is distinctly swollen; thence, becoming attenuated, it runs on as an excessively slender wire of equal diameter. Around this basal part wind one or more spiral thickened bands, varying, in different species, as to their number, the number of volutions made by each, and the angle which the spiral forms with the axis. The direction is from east to north. The spiral armature I call the screw, or *strebla*. There is no other form of armature than this.

These thickened spiral bands afford insertion to a series of fine *setæ*, which I call *pterygia*. These are from eight to twelve in a single volution, and they project in a diagonal direction from the *ecthoræum*, but often become reverted. In some cases, perhaps in all, the *strebla* and the *pterygia* are continued beyond the swollen portion of the *ecthoræum*, even to the end of the attenuated part.

2. Tangled cnidæ (*Cnidæ glomiferæ*). This sort differs from the preceding chiefly in the uniform slenderness of the *ecthoræum*, which lies coiled up more or less regularly in the *cnida*, without any chamber. *Corynactis viridis* affords excellent examples for observation.

3. Spiral cnidæ (*C. cochleatæ*). The walls of the tentacles, in a few species, contain very elongated fusiform *cnidæ*, which seem

composed of a slender thread coiled up in a very close and regular spiral, bearing a resemblance to the shell of a *Cerithium*. The *ecthoræum* is discharged reluctantly, and the wall of the *cnida* is very subtile.

4. Globate cnidæ (*Cnidæ globatæ*)? These are globose vesicles found in the *acontium* of *S. parasitica*, which have some characters in common with the *cnidæ*, but of whose real nature I am doubtful.

In the indubitable *cnidæ* the emission of the *ecthoræum* is a process of eversion. This is proved by many circumstances, such as the order in which the portions are evolved, the basal portion first; as well as by direct observation, the terminal part of the *ecthoræum* being occasionally detected in running out through the centre of the portion already evolved.

The *cnidæ* are filled with a fluid, which holds organic corpuscles in suspension, and these are seen driven rapidly through the *ecthoræum* in the process of eversion. I conclude that in this fluid resides the expansile force, which, on the excitement of a suitable stimulus, distends and projects the tubular portion of the wall that has hitherto been inverted.

All of the four kinds of *cnidæ* enumerated have been at various times seen surrounded by a membranous investiture, which I distinguish as the *peribola*. This coat must be ruptured before the *cnida* can emit the *ecthoræum*.

Several experiments show that the *ecthoræum* has the power of penetrating the tissues of other creatures, and even of the Vertebrata. In some of these experiments shavings of human cuticle, presented for an instant to the tentacles of *B. crassicornis*, and to the *acontium* of *S. parasitica*, were found on examination to be pierced through with numerous *cnidæ*.

Experiments with blue vegetable juices were instituted, with a view to test the acid or alkaline properties of the poisonous fluid supposed to be ejected on the discharge of the *ecthoræum*; but with no definite result. The existence of such a poisonous fluid is inferred, however, with a degree of probability amounting to moral certainty, and that of such concentrated power as, under certain circumstances, to destroy life with great rapidity, even in vertebrate animals.

Admitting the existence of a venomous fluid, it is difficult to

determine where it is lodged, and how it is injected. I incline to the hypothesis, that the cavity of the *ecthorœum* in its primal inverted condition, while it yet remains coiled up in the *cnida*, is occupied with the poisonous fluid, and that it is poured out gradually, within the tissues of the victim, as the evolving tip of the wire penetrates farther and farther into the wound.

The paper is illustrated by figures of the organs described.

February 11, 1858.

Major-General SABINE, Treasurer and V.P., in the Chair.

The following communication was read :—

"An Account of some recent Researches near Cairo, undertaken with the view of throwing light upon the Geological History of the Alluvial Land of Egypt."—Part II. By LEONARD HORNER, Esq., V.P.R.S. Received January 25, 1858.

(Abstract.)

In the first part of this Memoir, read on the 8th of February, 1855, and published in Part I. of the Transactions of that year, the author states the main object of the inquiry to have been, to endeavour, by probing the alluvial land in appropriate places, to discover the probable time that has elapsed since the lowest layer of Nile sediment was deposited, and thus to connect geological and historical time. This object, in the opinion of the author, can only be attained by means of shafts and borings of the soil in the immediate neighbourhood of monuments of a known age. The places he selected for these excavations were the vicinity of the Obelisk of Heliopolis, and the site of ancient Memphis. The general introductory matter, and the analyses of the various soils penetrated, together with a description of the researches at Heliopolis, are given in the first part of the memoir; but the author deferred his general conclusions, and all inferences as to the secular increase of the alluvial deposits, until he should have an opportunity of laying before the Society an account of the more extensive researches in the district of Memphis. That